Optimization of the Touchscreen-Based Visuomotor Conditional Learning Task in Mice

The translational gap between animal models and clinical trials is a longstanding, yet largely unresolved, limitation in the study of cognition. This discrepancy is largely due to the differences in how cognition is assessed in animal models compared to those in clinical populations. In the stimulus-response (S-R) learning literature, for example, the techniques used to assess the acquisition of habitual behaviour differ greatly across species, leading to poor cross-species translation and often conflicting results. As a result, we set out to optimize a S-R learning task in mice using the touchscreen-based operant technologies. Similar to human studies, this touchscreen technique encourages animals to respond to visual stimuli displayed on a touchscreen according to a specific rule. Allowing for very similar, if not identical, cognitive assays in mice and men, this technique promotes high translational potential and a high degree of standardisation. Originally developed for rats, the Visuomotor Conditional Learning (VMCL) task encourages animals to learn arbitrary associations between visual stimuli and motor responses. In naïve C57BL/6 mice, we sought to optimize VMCL task parameters to promote better and more efficient responding, identifying the length of inter-trial intervals and the limited hold period as two potential candidates. The validation of this task will provide a novel means through which to study the neural correlates of S-R learning, and its use in conjunction with fiber photometry recordings may be provided.